

## SCIENCE

Incorporating the best-available scientific knowledge into all CALFED Program activities and decisions is the goal of the CALFED Science Program. In addition to exploring questions specific to individual projects, the Science Program focuses on large-scale issues that cut across multiple program objectives and regions and address critical resource management questions facing the CALFED Program.

### Summary of Accomplishments

- First year of operation completed for Independent Science Board, with work launched on complex and challenging issues such as Delta levee integrity, the Delta Improvements Package, Environmental Water Programs and Ecosystem Restoration integration, and performance assessment.
- First Science Program Proposal Solicitation Package (PSP) developed and released. Approximately \$20 million will be spent to improve knowledge of key aquatic species, further the understanding of ecosystem processes in the Sacramento-San Joaquin Delta and its tributaries, and to gain a framework for assessing future change.
- Formal post-doctoral research program started, the SeaGrant Science Fellows, to bring together academic scientists, CALFED agency scientists and senior research mentors in collaborative data analysis and research projects relevant to Program objectives.
- Fourth technical review of the Environmental Water Account successfully completed, and technical workshop completed in the fall of 2004 to consider EWA implementation and its affect on delta smelt and salmonids.
- Several workshops convened to address relevant and topical issues. Highlights for 2004 included a workshop focusing on gravel augmentation and trends in river restorations, a technical conference on Suisun Marsh, and a workshop that took a comprehensive look at contaminant issues in the Bay-Delta.
- Third biennial CALFED Science Conference organized, bringing together scientists, managers, and policy-makers in an open environment to discuss the latest scientific findings relevant to the Bay-Delta system. The three-day conference was attended by more than 1,200 people and included 239 oral presentations and approximately 185 posters.
- Studies and analyses launched in areas of Delta water quality, sediment, hydrodynamic processes, and fish tracking supported.
- Guidance provided for Program performance measures and indicators to assess how projects and programs are meeting their objectives.

### Science Program Reviews and Workshops – 2004

#### Program Level Reviews

*EWA Technical Review Panel*

*CALSIM II Review*

#### Project Level Reviews

*Battle Creek*

#### Workshops

*Contaminant Stressors in the Bay-Delta Workshop*

*Making Science Work for Suisun Marsh Workshop*

*Gravel Workshop*

*EWA Salmonid and Delta Smelt Workshop*

#### Symposia

*Water Operations II Symposium*

#### Conferences

*3<sup>rd</sup> Biennial CALFED Science Conference*



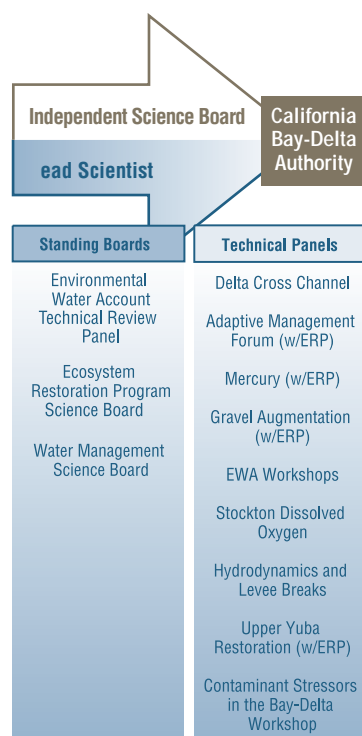
## Message from Lead Scientist Dr. Johnnie Moore

To ensure that the best available scientific information is applied in a credible manner, the Authority structure includes significant roles for the Lead Scientist and the Independent Science Board. Both report directly to the California Bay-Delta Authority and have significant responsibilities to provide broad guidance and oversight to implementation of the CALFED Record of Decision that include the translation of management issues into scientific questions that can be integrated into CALFED agency actions.

The Lead Scientist, working with the Authority staff, CALFED agencies and stakeholder interests, has the responsibility for developing the specific scientific questions that standing boards or panels address. The Science Program approach to advising the CALFED agencies during implementation of the CALFED Record of Decision includes near-term and mid-term strategies. Near-term efforts are conducted over the next year; mid-term strategies focus on a longer timeframe of at least several years.

In the near-term, the Science Program works with the CALFED agencies to present workshops on important management issues and provide independent annual technical reviews of various CALFED programs (e.g., the Environmental Water Account), and reviews of management tools (e.g., the CALSIM II model) and scientific studies (e.g., the Delta Cross Channel studies) used to inform various actions and provide insight into the design and implementation of various programs.

## Science Board and Technical Panels



Over the mid-term, the goal of the Science Program is to identify issues that are and will be of substantial concern regionally, over the next several years to decades, and that affect the CALFED Program's goals of water supply and ecosystem sustainability. To meet this goal, the Science Program funds targeted research through a competitive proposal solicitation process. Another mid-term challenge for the Science Program is to educate a wide array of Californians about the scientific challenges confronting the CALFED agencies, why these issues are important to address, and how the state and federal agencies plan to approach these challenges during implementation of the CALFED Record of Decision. The biannual CALFED Science Conference, the San Francisco Estuary and Watershed Science online journal, Science-in-Action papers and Management Cues publications are all major communications efforts to help inform California citizens and agency staff.

## 2004 Independent Science Board Members

### Ken Cummins, Ph.D.

Senior Advisory Scientist, California Cooperative Fisheries Unit, and Adjunct Professor, Humboldt State University

### Thomas Dunne, Ph.D.

Professor, Donald Bren School of Environmental Science and Management and of Geological Sciences, University of California Santa Barbara

### David Freyberg, Ph.D.

Associate Professor, Department of Civil & Environmental Engineering, Stanford University

### William Glaze, Ph.D.

Professor, Department of Environmental and Biomolecular Systems, Oregon Health and Science University

### Helen Ingram, Ph.D.

Professor of Social Ecology, University of California, Irvine

### Jack Keller, Ph.D.

Principal, Keller-Bleisner Engineering, and Professor Emeritus, Utah State University

### Jeff Koseff, Ph.D.

Professor of Environmental Fluid Mechanics in the Department of Civil and Environmental Engineering, Stanford University

### Samuel Luoma, Ph.D.

Senior Research Hydrologist with the US Geological Survey

### John Melack, Ph.D.

Professor, Donald Bren School of Environmental Science and Management, and Department of Ecology, Evolution and Marine Biology, University of California, Santa Barbara

### Judith Meyer, Ph.D.

Distinguished Research Professor of Ecology, University of Georgia

### Jeff Mount, Ph.D.

Professor, Department of Geology, University of California, Davis

### Duncan Patten, Ph.D.

Research Professor, Montana State University

### Denise Reed, Ph.D.

Professor, Department of Geology and Geophysics, University of New Orleans

### Kenneth Rose, Ph.D.

Professor, Department of Oceanography & Coastal Sciences/Coastal Fisheries Institute, Louisiana State University

### Robert Twiss, Ph.D.

Professor, Graduate Center for Environmental Design Research, University of California, Berkeley

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## PROJECT HIGHLIGHT

## Independent Science Board

*The Independent Science Board (ISB) is a standing board of distinguished experts (scientists and engineers) with a range of multi-disciplinary expertise. The ISB advises and makes recommendations to the Authority and the Bay-Delta Public Advisory Committee, as appropriate, on the science relative to the implementation of all program elements.*

*The role and importance of the ISB is paramount to addressing water resources and management decisions because comments and recommendations from the ISB serve as a foundation to help guide the Authority while addressing complex, long-term problems.*

*The ISB does not pass direct judgment on the success or failure of the Authority's programs; rather, it provides insights that can make the science underlying those programs, the application of that science, and the technical aspects of those programs the best that they can be. The benefit of their work and that of other standing boards and technical panels is increased transparency and accountability for implementation across CALFED programs.*

- Recent activities of the ISB have included initial review and recommendations to the Authority regarding the Delta Improvements Package. These recommendations called for new assessments, reinforcements, and approaches to existing monitoring programs to preserve long-term data sets; a continuation and integration of modeling efforts to consider long-term, ecosystem-wide benefits and risks; and the development of guidelines for incorporating current scientific knowledge and procedures into technical documents that support Authority decisions.
- The ISB is currently conducting fact-finding for several scientific topics including the status of knowledge on the integrity of Delta levees, monitoring and modeling, and EWA/ERP integration.

*The ISB is one part of the independent review system the Authority, and its staff, or CALFED agencies have used, and will continue to use, to integrate, review and advise across the CALFED Program. Other standing boards that provide independent review are the EWA Technical Review Panel, the ERP Science Board, and the newly formed Water Management Science Board. More information about the ISB and other standing technical boards can be found at [http://science.calwater.ca.gov/sci\\_tools/isb.shtml](http://science.calwater.ca.gov/sci_tools/isb.shtml)*

## PROJECT HIGHLIGHT

## Journal Highlight

### PUBLICATION OF SAN FRANCISCO ESTUARY AND WATERSHED SCIENCE JOURNAL AND ARCHIVES

*San Francisco Estuary and Watershed Science is an open access, peer-reviewed, electronic journal. The Journal focuses on contemporary scientific findings in the science of estuaries and watersheds, with a particular emphasis on the San Francisco Estuary and the watersheds that drain into it. The Journal was developed as a communication tool in support of the Science Program's mission for integrating world-class science and peer-review into every aspect of the CALFED Program. San Francisco Estuary and Watershed Archive is a companion service to the peer-reviewed electronic journal. The Archive provides Internet access to important historical documents, such as surveys, project reports, strategic planning reports, maps, and collections of articles currently out of print. Both the Journal and Archive were developed by the California Bay-Delta Authority Science Program, the California Digital Library, the University of California - Davis, and the John Muir Institute of the Environment.*

- Three Journal issues have been published since October 2003 – each presenting a different type of scholarly work: an edited volume, a monograph, and a collection of standard “journal-length” articles.
- Journal content is indexed by several online reference libraries, allowing for wider accessibility, leading to increased visibility and submission.
- Web site hits to the Journal exceeded 3,000 for the first volume and hundreds of hits for subsequent volumes.
- An Historical Review of the Fish and Wildlife Resources of the San Francisco Bay Area, by John Skinner and published by the California Department of Fish and Game, is now available through the Archive.
- In 2005, the Archive will post San Francisco Bay: the Urbanized Estuary, edited by T. John Conomos and published by the Pacific Division AAAS.

**SAN FRANCISCO ESTUARY & WATERSHED SCIENCE**

Published by the California Bay-Delta Authority Science Program and the John Muir Institute of the Environment

San Francisco Estuary and Watershed Science can be accessed at <http://www.estuaryscience.org>.

San Francisco Estuary and Watershed Archive can be accessed at <http://www.estuaryarchive.org>.



## PROJECT HIGHLIGHT

### Tidal Marsh, Wetlands and Floodplain Research

*Recent research on floodplain habitat – an important but limited habitat for species of concern in the Bay-Delta region – comes from two sites: the Cosumnes River and the Yolo Bypass on the Sacramento River. The Yolo Bypass was constructed in the 1930s to route excess floodwaters through land used for agriculture and wildlife habitat when dry. The Cosumnes is unique because it has no large dams, making it the only river in the Bay-Delta region with a nearly unregulated hydrograph. Tidal marshes, another rare remnant habitat for special status species, are not static systems. They result from flows of energy and material, inputs and outputs that change each day (like the tides), over decades (like sediment supply) and over centuries (like sea level). Thus, wetland restoration must focus on details of water circulation, tidal action, sediment supply, the geomorphology of the area, and how these aspects change over time, to develop the potential for sustainable intertidal marsh habitat at project sites. Within these issues of tidal marsh, wetland, and floodplain research, CALFED-funded science is revealing that significant ecosystem restoration opportunities do exist and can provide benefits to native plants, fish, birds, and insects.*

- *Winter inundation of Yolo Bypass farmland provides high quality habitat for native fishes, indicating that land can be managed simultaneously for floods, farms and fish.*
- *Multiple, short-lived flood pulses followed by long draining periods may produce more phytoplankton than the simpler hydrograph of the Yolo Bypass. To restore ecosystem attributes of floodplains, managers may need to operate dams and flood control structures to vary the timing and duration of floodplain flows.*
- *Experimental breaching of levees on the Cosumnes River demonstrates that floodplains can be restored with benefits for native birds, bats, plants and fish.*

- *Some native fish species may not be as susceptible to seasonal stranding on floodplains as previously thought. This knowledge might lead to opportunities for greater flood control capacity on floodplains while moving towards restoration goals.*
- *By inundating floodplains early in the year, then allowing them to dry out, managers may be able to enhance native fish production while limiting the success of undesirable non-native fish.*
- *The quality rather than the quantity of food may be a limiting factor for some species of concern. Floodplain restoration has the potential to increase productivity in the San Francisco Estuary, because of the production of phytoplankton and zooplankton that can then flush to riverine systems.*
- *Science suggests that designing wetland restoration projects with accurate elevation data is critical to determining whether a project can support sustainable intertidal marshes and how much habitat can develop within a project site. Using new methods for precisely measuring elevation could help managers in their efforts.*
- *Recent work demonstrates that tule marsh restoration projects can flourish in the Delta if the base elevation is sufficient for vegetation to colonize. This indicates that enough sediment exists in the system now to allow growth of tule marshes in some regions of the Delta given proper elevations and the maintenance of hydrologic processes.*
- *Studies in Suisun Marsh show that salinity in the rooting zone influences regional vegetation patterns, suggesting that soil salinity provides an important environmental framework for other ecological interactions.*

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